

CLAIMS

What is claimed is:

Sub  
A1

1. A laminated bushing assembly comprising;  
an inner and outer sleeve concentric about an axis;  
a spirally shaped cavity disposed between said inner and outer sleeves,  
a resilient material disposed within said spirally shaped cavity to control relative  
movement between said inner and outer sleeves.
2. The bushing of claim 1, wherein said inner sleeve, outer sleeve and said  
spirally shaped cavity are formed from metal sheet.
3. The bushing of claim 2, wherein said inner sleeve and said spirally  
shaped cavity are formed from a common metal sheet.
4. The bushing of claim 2, wherein said resilient material is adhered to said  
metal sheet.
5. The assembly of claim 2, wherein said resilient material disposed within  
said spirally shaped cavity is mechanically compressed by said metal sheet.
6. The assembly of claim 1, wherein said resilient material is vulcanized  
rubber.
7. The bushing of claim 2, further including a plurality grooves disposed in  
said metal sheet such that resistance to movement of said resilient material in a direction  
transverse to said grooves is greater than resistance to movement in a direction  
substantially parallel to said grooves.

A)

8. The bushing of claim 7, wherein said pluralities of grooves are disposed perpendicular to said axis.

9. The bushing of claim 7, wherein said plurality of grooves are disposed parallel to said axis.

10. The bushing of claim 7, wherein said plurality of grooves are disposed spirally along said axis.

20200707 16:05:00

AM

11. A suspension assembly for a motor vehicle comprising;  
a mount attached to said motor vehicle;  
a suspension member attached to said mount; and  
a laminated bushing assembly mounted between said mount and said suspension member to control movement of said suspension member relative to said mount;  
said laminated bushing assembly including a metal sheet spirally wound about a longitudinal axis to form a spirally shaped cavity disposed within an outer sleeve, and a resilient material disposed within said spirally shaped cavity and between said spirally wound metal sheet.

12. The suspension assembly of claim 11, wherein said laminated bushing includes a plurality of grooves disposed in said metal sheet such that resistance to movement of said resilient material in a direction transverse to said grooves is greater than resistance to movement in a direction substantially parallel to said grooves.

13. The assembly of claim 12, wherein said pluralities of grooves are disposed perpendicular to said longitudinal axis.

14. The assembly of claim 12, wherein said plurality of grooves are disposed parallel to said longitudinal axis.

15. The assembly of claim 12, wherein said plurality of grooves are disposed spirally along said longitudinal axis.

16. The assembly of claim 11, where said suspension member is a leaf spring assembly.

20201010 10:06:00

M 17. The assembly of claim 11, wherein said suspension member is a wheel assembly including upper and lower control arms pivotally attached to a knuckle arm at one end and to a frame member at an end opposite said knuckle arm.

18. The assembly of claim 11, wherein said suspension member is a stabilizer bar.

20201010 10:03:03

A1

19. A hinge assembly for a door comprising;  
a support;  
a laminated bushing assembly mounted along an axis between said door and said support to provide for rotation of said door between an open and a closed position;  
said laminated bushing including an inner and outer sleeve concentric about said axis, one of said inner and outer sleeves attached to said support and the other of said inner and outer sleeves attached to said door;  
a spirally shaped cavity disposed between said inner and outer sleeves;  
a resilient material disposed within said spirally shaped cavity; and  
a plurality of grooves disposed spirally along said axis in said inner sleeve, outer sleeve and said spirally shaped cavity such that resistance to movement of said resilient material in a direction transverse to said grooves is greater than resistance to movement in a direction substantially parallel to said grooves such that said inner sleeve is guided axially a distance proportional to relative rotation between said inner and outer sleeve.

20. The assembly of claim 19, wherein said axis is vertical and said spirally wound grooves direct movement of said door upward in proportion to relative rotation between said inner and outer sleeve, and a weight of said door exerted downward on said laminated bushing rotates said door toward said closed position.

20200701 16065007

A1

21. A method of forming a laminated bushing, said method including the steps of;

- a. affixing a resilient material to a metal sheet;
- b. spirally winding said metal sheet back over said resilient material about an axis to form a spirally shaped cavity such that said resilient material is disposed within said spirally shaped cavity;
- c. inserting said spirally shaped cavity within an outer sleeve and an inner sleeve concentric about said axis.

22. The method of claim 21, further including the step of mechanically compressing said resilient material within said spirally shaped cavity.

23. The method of claim 21, wherein said resilient material is rubber and further including the step of vulcanizing said rubber.

24. The method of claim 21, further including the step of forming a plurality of mechanically formed grooves within said metal sheet.

25. The method of claim 21, wherein said metal sheet is rolled in a length and said laminated bushings are formed by cutting said length into smaller required lengths.

26. The method of claim 21, wherein said inner sleeve and said outer sleeve and spirally shaped cavity are formed from a common metal sheet.

20200707 16:06:00